

# 湖北松滋早始新世一鸟化石

侯连海

(中国科学院古脊椎动物与古人类研究所)

**关键词** 湖北松滋 始新世 鹤形目

## 内 容 提 要

本文记述了采自湖北松滋县王家桥区黑档口早始新世洋溪组页岩中一保存较好的鸟化石。依其形态特征归于鹤形目内,但它与已知鹤形目各科又有某些明显的区别,与秧鸡科比较接近。建立一新科:松滋鸟科 *Songzidae* fam. nov. 代表我国已知鹤形目化石最早的记录。这一发现还证明始新世早期亚洲东北部北纬  $30^{\circ}$  左右已有比较原始的小型鹤形目鸟类分布。本文还讨论了松滋鸟的某些形态功能。

## 一、前 言

1987年春,古鱼类学家张弥曼等在湖北省松滋县考察鱼类化石时,于王家桥区黑档口始新世褐色页岩中偶然采获一保存比较好的小型鸟化石。这只小鸟头微仰、翼前伸、尾上翘、两条细长的腿似要蹬地而起,姿态优美,栩栩如生。除山东山旺中新世鸟类以外,它是迄今我国发现保存最好的鸟化石。就是在始新世早期世界鸟类化石中亦是保存最好者之一。我国始新世鸟化石产地很少,而且全是零散破碎的肢骨。因此,松滋鸟化石发现本身就具有重要意义。

老第三纪,特别是始新世,是鸟类辐射发展时期,是研究鸟类分化发展的重要阶段。松滋标本也显示出了自身的时代特征:鼻骨不向后伸,为全鼻型(Holorhinol),下颌后关节突不发育;第1趾发育等等。现在仅就松滋鸟化石的形态特征、分类位置和形态功能等几个方面研究的结果,予以报道。

## 二、标 本 记 述

**鹤形目** *Gruiformes* Coues, 1884

**松滋鸟科(新科)** *Songzidae* fam. nov.

**松滋鸟属(新属)** *Songzia* gen. nov.

**黑档口松滋鸟(新种)** *Songzia heidangkouensis* sp. nov.

(图版 I, 图 1)

**正型标本** 一具不完整的骨架。古脊椎动物与古人类所室内编号 V8756。

**标本产地** 湖北省松滋县王家桥区黑档口。

**时代与层位** 洋溪组褐色页岩。早始新世。

**种的特征** 头骨具一背弯曲, 鼻骨不向后伸, 为全鼻型。下颌后关节突不发育, 嘴峰长度较脑颅长度为短。尺骨直, 胫跗骨远端内关节髁发育呈球形, 骨质腱桥结节特别发育, 跗蹠骨较长, 超过胫跗骨的  $2/3$ , 中趾加爪之长不超过跗蹠骨之长。

**标本测量(单位: 毫米)**

头骨全长	37.5
嘴峰长(前上颌骨与额骨接触处)	18
头骨最高	14.5
下颌骨全长	30.5
尺骨长	18.5
桡骨长	17.5
腕掌骨长	10.5
第2指骨第1指节骨长	5.5
股骨全长	19
胫跗骨全长	34
跗蹠骨全长	24
第1趾骨(带爪)长	13
第2趾骨(带爪)长	18
第3趾骨(带爪)长	22.5
第4趾骨(带爪)长	18.5
腰带最长	22.2

**描述** 松滋标本, 如图版 I 所示, 除颈椎、背椎和部分前肢外, 其余骨骼基本保存。鸟体呈侧卧式埋藏于页岩内, 除尾椎稍有散乱外, 各部骨骼呈自然状态。头侧视, 头骨比较低, 后部顶骨区圆, 前部额骨区有一背弯曲, 额骨与鼻骨关节处也有一较小的凹陷。细长的前颌骨后突镶在鼻骨前颌骨突之间, 形成窄和较长的外鼻孔。外鼻孔后缘由鼻骨的颌突和前上颌骨的鼻突组成, 鼻骨的颌突不向后伸展。这种吻部形态比较原始, 与秧鸡科相似。松滋鸟的下颌骨下

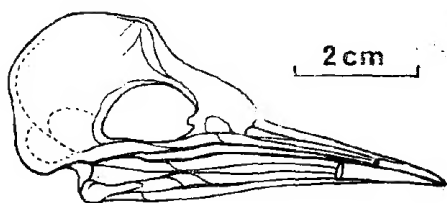


图1 黑档口松滋鸟(新属新种)头骨右侧视  
Fig. 1 Skull and mandibles of *Songzia heidangkouensis* in right lateral view

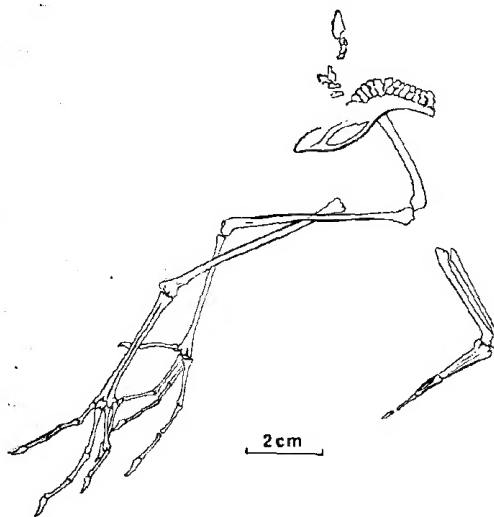


图2 黑档口松滋鸟(新属新种), 头后骨骼, 侧视  
Fig. 2 Partial skeleton of *Songzia heidangkouensis* in right lateral view

缘特别直, 其后关节突很小, 下颌孔不清楚, 冠状突很低等。由于前颌骨鼻骨突细长和鼻

骨的颌突窄而形成了窄和较长的外鼻孔。

前已述及松滋鸟呈侧卧式,页岩打开将鸟体分为两部分,骨骼多保存在右侧视的岩面上,头后骨骼,前肢左侧除肱骨外保存基本完整。尺骨直,其长短于腕掌骨加指节骨,近端鹰嘴突小,骨体的次级飞羽乳突不明显。第3掌骨细而直,掌骨间隔窄,没有掌骨间结节。第2指骨比较长,末节尖细。

后肢骨骼,股骨近端挤压在髓臼内观察不清,它骨体微弯,比较强壮,远端关节髁比较大,向后倾斜。胫跗骨一对,保存较好,细而直,比跗蹠骨长约1/3,近端胫骨嵴不太发育,骨体后面较平,前面近末端外侧壁隆起,其末端内关节髁前视呈球形,骨质腱桥结节特别发育,后髁间沟很浅。值得注意的是,腓骨及胫跗骨上的腓骨嵴都观察不到。跗蹠骨比较短,这是早期小型涉水鸟的共同特征。近端顶视,跗蹠骨内,外两杯状凹几乎相等,比较大,杯间隔特别高;前视,跗蹠骨具长而窄的蹠骨前沟,远端3个趾骨滑车不等长:第3趾滑车最长,第2趾滑车较第4趾滑车稍短,但不向后转,第4趾滑车之长超过第3趾滑车之半,滑车间距窄。趾骨为不等足型,趾骨细长,第3趾最长,但趾骨加爪之长不超过跗蹠骨之长,而是接近相等;第1趾发育,其长超过第3趾长之半(秧鸡科第1趾长不超过第3趾之半),爪比较短小,屈筋结节(flexor tubercles)不发育和伸筋沟较短。腰带与其他部位的骨骼相比,保存比较完整,愈合荐椎至少由12个组成,髂骨虽然观察不清,但从轮廓看比较高,耻骨发育,坐骨细长,耻坐窗窄,髓臼看不清,总的形态为窄长型,与猛禽和地栖鸟类明显不同。

**比较和讨论** 如化石所示,初步观察,个体小,后肢细长,很像雀形目(Passeriformes)鸟类。但稍仔细审视,松滋标本胫跗骨和跗蹠骨不但骨体前面具有长的沟,而且趾骨滑车长短不等,第2趾滑车最短,雀形目鸟类胫跗骨和跗蹠骨全呈近似圆筒形,跗蹠骨趾骨滑车小而相等,仅此就可以判定松滋标本不可能是雀形目的成员。

依据鸟类的分类,松滋标本以上描述的形态性质应为涉水类,特别与鹤形目接近。例如头骨比较低,嘴直呈锥形,外鼻孔较长,腿长和爪短等,尤其是跗蹠骨第2趾滑车短,因此松滋标本应是鹤形目的分子。

鹤形目的化石,最早发现属于秧鸡次亚目的一个科(Laornithidae, Cracraft, 1973)产地在北美新泽西州的晚白垩世,材料仅有右胫跗骨远端,它是与鹤形目的秧鸡科有一定关系的小形涉禽类,代表属种: *Laornis edwardsianus*, 其主要特征是没有骨质腱桥结节,后髁间凹特别浅而宽,内髁较大等。与松滋标本对比异同点是很明显的:松滋标本具有发育的骨质腱桥结节,内髁特别大,但髁间后沟与它相似,因而不能说两者没有一定的关系。

与松滋标本时代相同,关系比较密切的是几个秧鸡科的属: *Palaeorallus* (Wetmore, 1931), *Eocrex* (Wetmore, 1931) 两属发现于北美怀俄明(Wyoming)早始新世(Wasatch formation), *Aletornis* (Marsh, 1872), *Fulicalernis* (Lambrecht, 1933) 两属也发现在怀俄明地区,但时代为中始新世,另一是 *Ibidopsis* (Lydekker, 1891) 产于英国晚始新世。这几属中与松滋标本比较接近的是 *Palaeorallus*, 如表1所示:胫跗骨远端,后髁间沟浅,两髁向内倾等,但 *Palaeorallus* 胫跗骨远端内髁小、窄,骨质腱桥结节很小等显示出秧鸡科的特征,与松滋标本仍有明显差异。

我国鹤形目中秧鸡类化石仅山东山旺中新世的扬氏秀丽鸟(*Youngornis gracilis*

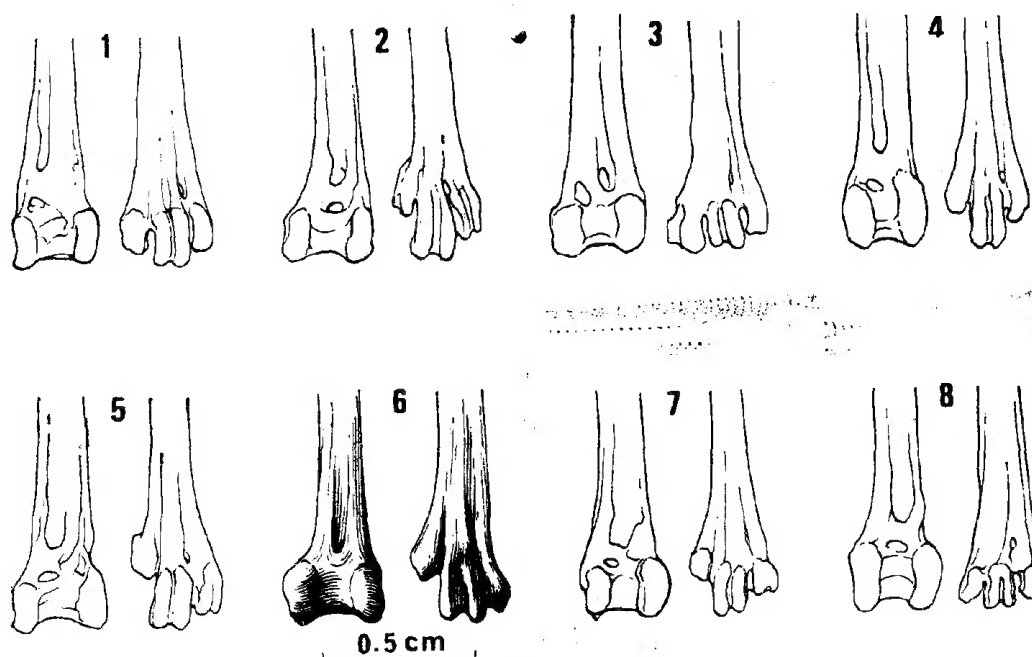


图 3 1. 鹳形目、2. 雁形目、3. 隼形目、4. 鸡形目、5. 鹳形目、6. 松滋鸟、  
7. 鸻形目、8. 雀形目等胫跗骨和跗跖骨远端比较

Fig. 3 Comparison of tibiotarsus and tarsometatarsus of Ciconiiformes, Anseriformes, Falciformes, Galliformes, Gruiformes, Songzia, Charadriiformes and Passeriformes

表 1 秧鸡次亚目各科与松滋鸟科(新科)胫跗骨远端形态比较

Table 1 Morphological comparison of tibiotarsus of Rallidae, Songzidae, fam. nov. and Laornithidae

胫跗骨远端	<i>Eocrex primus</i>	<i>Songzia heidongkouensis</i> gen et sp. nov.	<i>Laorni edwardsianus</i>
内 髌	左右窄, 前部稍较外髌突出	球形	前部圆, 稍拉长, 并且较外髌突出
外 髌	前部圆, 但末端低, 后部末端稍抬高	不向骨体外扩展	很圆, 向骨体外扩展
前髌间凹	深、窄	浅	浅
骨质腱桥	上下窄, 骨质腱桥结节近乎缺失	骨质腱桥结节特别发育	上下宽, 但无结节
髌的位置	稍向内倾, 两髌接近平行	向内倾斜	向内倾
后髌间沟	深	浅	浅而且宽

Yeh, 1981), 它头小、嘴短, 跗跖骨较短等与松滋标本很不相似。周口店更新世北京猿人产地第一地点和第十五地点各发现几件秧鸡类的肱骨, 与松滋标本不能进行直接对比。

另外, 1984 年 Lance Grande 在他的绿河组的古生物和鱼类群的回顾中关于鸟化石部分展示了一尚未研究的可能是鹳形目的鸟化石, 与松滋标本也可能有些关系。

通过对比,可以认为松滋鸟化石标本与鹤形目中秧鸡次亚目的秧鸡科比较接近。主要异同点是:

**相似性状** 头骨低、下颌直,全鼻型。尺骨鹰嘴突不发育,趾骨细长,跗跖骨第2滑车短等。

**差异性状** 松滋标本头骨额部有一背弯曲,嘴峰长较脑颅长为短,下颌后关节突特别不发育,没有下颌孔;尺骨直,胫跗骨远端内关节髁发育呈球形,骨质腱桥结节特别发育,跗跖骨之长,超过胫跗骨的  $2/3$ ,中趾加爪之长不超过跗跖骨之长等。秧鸡科头骨较低,没有背弯曲,嘴强壮而且长,其长接近跗跖骨之长,或超过跗跖骨之长,胫跗骨外髁比内髁大,第1趾长不超过第3趾长之半等。

以上比较和讨论,已知松滋标本与秧鸡次亚目各科的区分特征。故建议订一新科:松滋鸟科 *Songzidae* fam. nov. 代表属: *Songzia* gen. nov. 属型种: *Songzia heidangkouensis* sp. nov.

鹤形目鸟类的系统关系,由于其组成成分比较复杂,故它们的关系各家说法不一。但它们之间有着共同的特征,例如,它们的脚适于涉水行走,颈和脚均较长,后趾不发达或完全退化,翼大都短圆和第1枚初级飞羽较第2枚短等等。Cracraft (1984) 认为它们在中生代白垩纪的某时期有共同祖先。因此它们的系统关系随着化石资料的不断丰富而有变化。Wetmore (1960) 将秧鸡型鸟类归于鹤亚目,并设一次亚目包括 *Rallidae* 和 *Idiornithidae* 两科;Brodkorb (1967) 又将 *Rallidae* 和 *Idiornithidae* 从鹤亚目中分离出来,建一秧鸡亚目。郑作新 (1982) 将鹤形目分成9个亚目,但秧鸡亚目被撤消,秧鸡科归于鹤亚目;Cracraft (1984) 主要依据胫跗骨形态进化的关系,又恢复秧鸡次亚目的建制,仍属鹤亚目,但秧鸡次亚目中他又设两个超科: *Rallidea* 和 *Laornithidea*,各含一科,他将 *Idiornithidae* 归入鹤次亚目内。综合以上各家的分类谱系,有一共同点,就是秧鸡类与鹤类鸟的亲缘关系比较密切。依本文前面对松滋鸟标本的比较和讨论,我们认为它应归于秧鸡次亚目,我们不认为在次亚目下设立超科是必要的。现用图表示松滋鸟科与秧鸡次亚目其他科之间的系统关系。

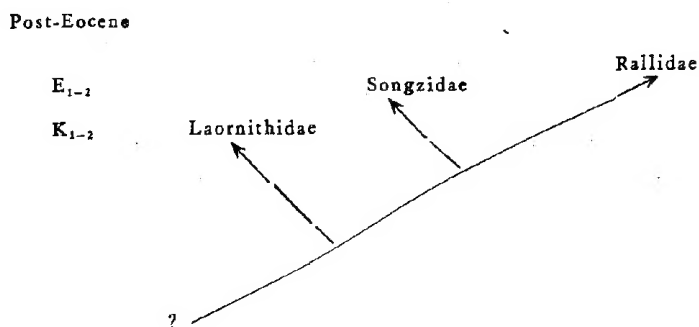


图4 松滋鸟与秧鸡次亚目各科的系统关系

Fig. 4 Proposed possible phylogeny for the Ralli

前已记述,松滋鸟具有不少比较原始的性状,如它属全鼻型,吻与颅骨关节间没有弹性带 (Zone elastica),所以其吻部活动受限制。松滋鸟胫跗骨远端骨质腱桥结节特别发

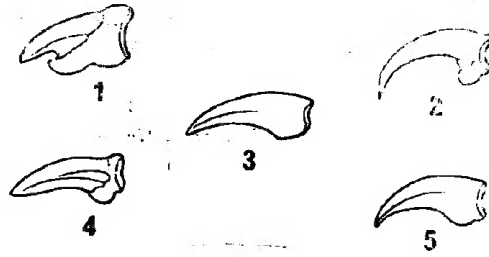


图 5 1.雁形目、2.隼形目、3.松滋鸟、4.鹤形目、5.鸡形目等爪的比较

Fig. 5 Comparison of claws of Anseriformes, Falcoconiformes, Songzia, Gruiformes, Galliformes

育,这也是一原始结构,它妨碍胫附骨肌腱的活动。另外,松滋鸟的爪短,屈肌结节不发育,尚属适应涉水能力不太强的小鸟。从形态构造反映出松滋鸟只能在沼泽地边、河畔和草丛中,具有比较丰富的、容易捕捉的小虫、小螺和种子等地区活动,为一类比较古老的小形涉水鸟类。

据地矿部宜昌地矿所雷奕振称,王家桥黑档口含松滋鸟化石的地层属于洋溪组中段,该组的时代,依据雷奕振等(1987)通过不同层位多门类化石的发现和硏究,同时结合岩石组合特征和地层层序的分析,洋溪组应为下始新统。

张弥曼赠送本文研究标本,雷奕振以及美国的 J. Cracraft, S. L. Olson, 法国的 C. Mourer-Chauviré 和澳大利亚的 P. V. Rich 赠送资料,沈文龙绘制插图,张杰印制图版,在此作者谨向诸位表示热忱的感谢。

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## AN EOCENE BIRD FROM SONGZI, HUBEI PROVINCE

Hou Lianhai

(Institute of Vertebrate Paleontology and Paleoanthropology, Academia Sinica)

**Key words** Songzi Hubei; Eocene; Gruiformes.

### Summary

An incomplete fossil bird skeleton with skull is described in this paper. It is identified as a new genus and species: *Songzia heidangkouensis*, and it represents a new family, *Songziidae*, of the Order, Gruiformes. The fossil was found by Prof. Zhang Miman and her colleagues from Eocene brown shale at Heidangkou, Wangjiaqiao, Songzi County, Hubei Province during the Spring of 1987.

It is the first discovery of bird fossil in Hubei.

The specimen herein described is stored in the collection of IVPP.

**Order Gruiformes Coues, 1884**

**Suborder Grues Bonaparte, 1854**

**Infraorder Ralli Reichenbach, 1852**

**family Songzidae fam. nov.**

**Diagnosis** Same as the genus.

***Songzia* gen. nov.**

**Type species** *Songzia heidangkouensis* sp. nov.

**Diagnosis** Same as the species.

***Songzia heidangkouensis* sp. nov.**

**Holotype** An incomplete skeleton with skull. Vertebrate Paleontology collection of IVPP. v 8756.

**Type Locality** Heidangkou, Wangjiaqiao, Songzi County, Hubei Province. This is a new locality of the fossil birds in China.

**Horizon** Yangxi Formation, Early Eocene.

**Diagnosis** An apparently large dorsal inflection of bill on frontal. Nasal not extend

downward. Skull holorhin-like. Posterior process of mandibular not developed. Bill shorter than cranium length. Ulna vertical in shaft. Internal condyle of tibiotarsus round. Tuberal of supratendinal bridge very developed. Tarsometatarsus longer than tibiotarsus's  $2/3$ . Digit III shorter than tarsometatarsus length.

**Measurements** The following measurements are taken from holotype of *Songzia heidangkouensis*. All are in millimeters.

Greatest length of skull 37.5; greatest height of skull 14.5; length of mandible 30.5; length of culmen 18; length of pelvis 22.2; length of ulna 18.5; radius length 17.5; carpometacarpus length 10.5; Digit II phalanx 1 length 5.5; overall length of femur 19; tibiotarsus overall length 34; tarsometatarsus overall length 24. Phalanges of pes (lengths): Digit I 13, Digit II 18, Digit III 22.5, Digit IV 18.5.

**Description** The specimen is an incomplete skeleton, without cervical and caudal vertebrae, coracoid, scapula, furcula, sternum and humerus. The skull and hindlimb bones have been considerably flattened and are now essentially two-dimensional. The skull is lowly level, and is round posteriorly. A dorsal inflection exists in the anterior skull. There is a small hollow between the nasal and frontal. The external naris is narrow and long. The end of nasal process of the premaxilla does not extend posteriorly. The shape of the skull is holorhin-like, which is a primitive shape. There is only one nasal-frontal hinge as in some rails.

Only the left side of ulna can be seen, it is almost vertical with shaft; the papillae of secondary are not well developed. It appears that the anconal surface of the shaft is probably more rounded. The olecranon is small. The ulna is shorter than carpometacarpus with the Digits. The radius is rather strong. The intermetacarpal space of carpometacarpus is narrow, but there is no intermetacarpal tuberosity in the carpometacarpus. Digit II of manus is long, and the end of phalanx is slender.

The head of femur is inserting in the acetabulum, the shaft is slightly curved and much stouter. The external and internal condyles of the femur are large and slant posteriorly. The relatively complete tibiotarsus is long and slender, it is longer than the tarsometatarsus. Cnemial crest of tibiotarsus on the proximal end is not developed. In posterior view the shaft is smooth, the external border of its proximal end is arch in shape; internal condyle is round in anterior view; the tubercle of supratendinal bridge is very developed; posterior intercondylar groove is very shallow. The fibular crests of tibiotarsus and fibula do not show. Tarsometatarsus is shorter than tibiotarsus. In proximal view of tarsometatarsus, the internal and external cotyla are nearly similar, both large. The intercotylar area is very high. The anterior metatarsal groove are long and narrow, the distal ends of the tarsometatarsus and trochlea are different in the length, trochlea III is the longest, trochlea II is slight shorter than the trochlea IV, but not inclined downward, the trochlea IV is longer than the half of trochlea III. Interchlea grooves are narrow. The Digits of the pes are slender and long and they are in different length. Digit 3 is the longest, Digit 2 and Digit 4 are nearly equal. Digit 3 is shorter than tarsometatarsus or is about equal to it. Digit 1 is developed, and it is longer than the half of Digit 3 (Digit 1 is not longer than the half of Digit 3 in the Rallidae). Claws are short, the flexor tubercles is not developed, extensor groove is short. The pelvis is shorter than Rallidae and other families of Ralli. Ilium is high, pubis is slender and ischium is developed, ischio-pubic fenestra is narrow.

**Discussion** The new family Songzidae, has comparatively close relationship with Rallidae, because they have some common characters, for example: both of them have flattened



skull, straight bills, long tibiotarsus and anterior metatarsal grooves and so on. However, the Songzidae differs from the Rallidae in several characters as follows: In lateral view, the frontal looks in the shape of arch, its external naris is longer. The internal condyle of tibiotarsus is round and large, inner trochlea of tarsometatarsus is longer and does not turn posteriorly.

To be compared with Laornithidae, from Late Cretaceous of North America, *Laornis edwardsianus* represented only by a distal end of right tibiotarsus, Songzidae has the following similar characters: The postercondylar sulcus of tibiotarsus is broad and very shallow, and inner condyle is round. But they have many different structures: Tubercle on supratendinal bridge of Songzidae is very developed, internal condyle large, and not projected, internal ligamental prominence is poorly developed, and small in size.



黑档口松滋鸟(新属新种) *Songzia heidangkouensis* gen et sp. nov. 左侧视 in left lateral view,  $\times 1$



黑档口松滋鸟(新属新种) *Songzia heidangkouensis* gen et sp. nov. 右侧视 in right lateral view,  $\times 1$